

# NASA TECH BRIEF

## Langley Research Center



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### Variable-Gap Bias Structure for Magnetic Bubble Memory Package

A permanent magnet bias structure has been designed which can accommodate bubble memory chips with different bias requirements. The basic design of the bias structure is conventional, but the size and thickness of the field adjusting plate can be varied to match the different bias requirements of memory chips inside the bias structure. Because the chips in the bias structure need not be matched in the bias margin, the memory chip specification is relaxed; and therefore the processing yield is increased. It is possible for a large bias structure to be used, which simplifies the design and reduces the module size and weight.

In the conventional design, the single bias structure requires that all chips be closely matched in the bias margin. This requirement greatly limits the tolerance in garnet wafer and device processing. Rather than mass producing a large number of chips to be sorted out into matched groups, it would be advantageous to design a bias structure to accommodate chips with different bias requirements. This type of structure is shown in the illustration.

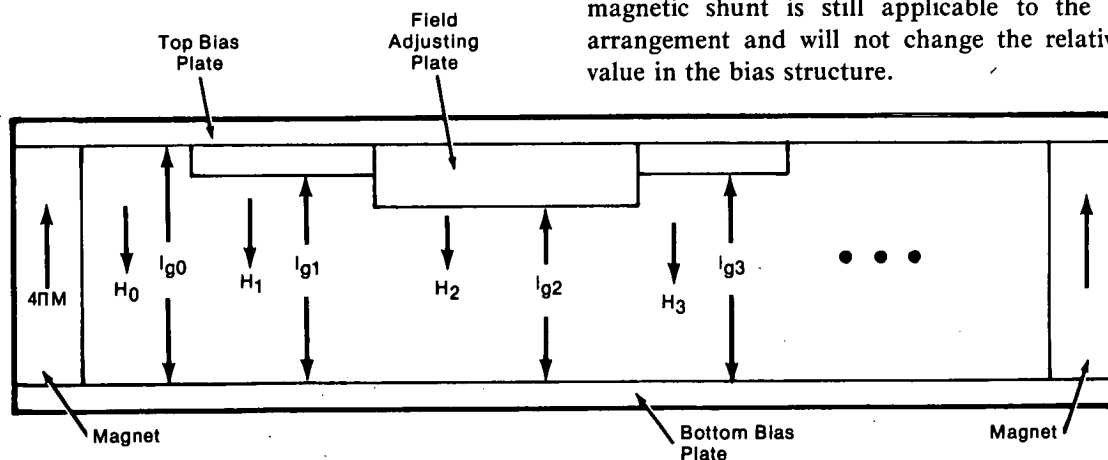
A staircase-type plate is used as the bias plate instead of a flat one. If the bias plate has sufficiently low coercivity, so that the magnetic potential drop across the plate is negligible, then the magnetic field  $H$  under the plate is a function of the gap width  $l$  according to the following relationships:

$$H_0 l_{g0} = H_1 l_{g1} = H_2 l_{g2} = \dots \quad (1)$$

$$H_0 : H_1 : H_2 : \dots \\ = 1/l_{g0} : 1/l_{g1} : 1/l_{g2} : \dots \quad (2)$$

$$\text{or } \Delta H_1 / H_0 = (H_1 - H_0) / H_0 = (l_{g0} - l_{g1}) / l_{g1} \\ = \Delta l_1 / l_{g1} \quad (3)$$

Therefore, the local field inside the bias structure can be adjusted by varying the gap width according to equation 3. This thickness variation can be achieved by simply epoxy bonding the magnetic plate (such as Mumetal or ferrite plate) to the basic bias plate. The regular method of adjusting the bias field by using magnetic shunt is still applicable to the present arrangement and will not change the relative field value in the bias structure.



Variable-Gap Bias Structure for Magnetic Module  
With Different Biased Memory Chips

(continued overleaf)

**Note:**

No further documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer

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**Patent status:**

Title to this invention has been waived under the provisions of the National Aeronautics and Space Act [42 U.S.C. 2457(f)], to the Rockwell International Corporation, 3370 Miraloma Avenue, Anaheim, California 92803.

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(LAR-11765)